political significance in the other South American countries during the course of this year. Unrest in Ecuador in May; a *coup d'état* in Peru in January; a military revolt and an attempt to depose President Lopez in Colombia; political conflicts in Chile; border disputes between Ecuador and Peru —all these are part and parcel of customary Latin American politics. But the resignation of the Brazilian Foreign Minister Oswaldo Aranha deserves attention. Aranha was an obedient follower of the USA and smoothed the path for Washington in Brazil; in summer, however, there were grave differences of opinion between him and the American Ambassador in Rio de Janeiro. The reason for these differences has not yet become known. Possibly Aranha refused to participate in the anti-Argentine policy of the USA.

CENTRAL AMERICA

Central America suffered from violent revolutionary unrest during the last few months. It cannot be said as yet that order has been finally restored in those countries. Of the so-called dictators ruling for years with Washington's permission and with a firm hand in Guatemala, Honduras, El Salvador, and Nicaragua, only Somoza in Nicaragua and Carias in Honduras have been able to maintain themselves, while Ubico in Guatemala and Martinez in El Salvador have had to leave the field in the course of the year. However, according to the latest reports, the days of power of Carias and Somoza, who are also confronted with great difficulties just now, seem to be numbered too.

Washington can hardly be interested at present in such unstable conditions unless it is aiming at a reunion of all of Central America into a federation. There are several indications that the Soviet Minister Umansky in Mexico has had a hand in these events, but whether with or without Washington's approval cannot yet be ascertained.

GESAROL—NEOCID—DDT

By R. WIESMANN

The war being waged at present among men all over the world has not put a stop to another struggle; man's war with the insects. The curious title to this article stands for a new weapon that has been developed within the last few years for the latter war. Perhaps the author, a Swiss, is a little too enthusiastic in his description, for "Time" in its issue of June 12, 1944, writes under the heading "Beetle Blaster": "DDT is not a kill-all. Against two of the most common US crop destroyers, the Mexican bean beetle and the cotton boll weevil, DDT has proved a disappointment." Yet the new discovery undoubtedly merits attention.

UNTIL recently, the most popular insecticides were arsenic compounds—lead arsenate and calcium arsenate—which, however, are poisonous to all living creatures. Hence there have long been endeavors to replace lead arsenate—which, although effective, has many hygienic drawbacks—by nonpoisonous substances. Nicotine derris and pyrethrum were unsuited wherever prolonged effectiveness was required. Moreover, no insecticides of lasting effectiveness against mosquitoes, lice, and especially flies were known until recently. Just after the outbreak of war, however, a Swiss firm succeeded in producing an insecticide known as "Gesarol" which, although extremely toxic to insects, is harmless to human beings and domestic animals. This quickly led to the production of other insecticides known under the collective name of "Neocid" or "DDT," which have acquired tremendous importance.

It took many years to achieve this result. Some ten years ago, after a few vague initial experiments, a small group of chemists began a systematic study of the problem. After four years of hard work, the practical solution to the first task they had set themselves was found: a new moth-proofing compound called "Mitin." Mitin is a product not only of toxological work but of dyestuff chemistry as well, and it may be regarded as a colorless, water-soluble dye with a toxic effect upon moths. Wool impregnated with it is mothproof for ever, as Mitin is impervious to light, to washing, and to hard rubbing. The next step was to isolate the nonwater-soluble toxic component from the chemical structure of the new product and examine it for its utility as a plant insecticide. What the chemists wanted to find was an insecticide similar to those produced by nature herself (pyrethrine, rotenone, etc.) but impervious to light

and chemical action. After having followed several false tracks, they finally managed to find a solution: an insecticide which was effective when eaten by the insects. Further studies produced a whole series of such insecticides.

However, this still left all those insects unaccounted for which suck their food as, for instance, lice, mosquitoes, flies. By combining other chemical groups with the insecticides already found in additional years of painstaking work, the first lasting synthetic contact insecticide was finally discovered. The new product did not have to be eaten by the insects: the creatures died from merely touching it. It belonged to the diaryltrichlormethylmethane group. The chemists working upon it believed themselves to be the first ever to have produced this group by synthesis. But a close check on all the literature on chemistry revealed the fact that more than seventy years ago a German student synthesized several representatives of this group but dismissed his discovery in six lines in a chemical journal. One of the most effective of these compounds, easily to be produced on a technical scale, was dichlordiphenyltrichlormethylmethane (DDT), one of the active principles of the Gesarol and Neocid group. Its chief ingredients are chlorine, alcohol, and sulphuric acid.

HOW IT WORKS

According to thorough toxological examinations, DDT exerts its effect upon the nerves of insects by mere contact. If, for example, weevils or flies are placed in glass bowls previously sprayed with a solution containing one per cent of Gesarol and allowed to walk around on the dried film, being afterwards placed in untreated bowls, the following can be observed. After 10 minutes of contact with the Gesarol film in the case of the weevils, and after no more than 30 seconds in the case of the flies, the insects soon show signs of paralysis of the legs, then of the wings, with ensuing total paralysis leading to their death. Once the first symptoms of paralysis have become apparent the insects are sure to perish. Hence the poisoning is not reversible.

The working of this poisoning can be explained as follows. The outer covering of the insect body, called chitin, is in turn covered by a lipoid, i.e., waxlike, film which is water-repellent. Since the dry contact insecticide is soluble in this lipoid substance, its penetration to the nerves is aided, indeed, made possible by this close-fitting "raincoat." It may also be assumed that the poison is very soluble in the nerve substance and is conducted by the nerves to the abdominal nerve center. This explains the progressive paralysis of the insects. Moreover, the effective components of the Gesarol-Neocid group are extremely toxic to insects even in infinitesimal quantities. Exact experiments have shown that, in the case of the ordinary fly and the moth caterpillar, one ten-thousandth of one millionth of a gram per square centimeter is sufficient to ensure death.

NO MORE ARSENATES

The plant insecticides of the Gesarol group have solved the arsenic problem in agriculture and fruit-growing. Experiments made since 1941 have proved that Gesarol combines the valuable properties of the arsenates—lasting effect and high toxicity—with the contact effect of the old, perishable contact insecticides. We have already stressed its harmlessness to man and beast. This has made it possible to combat pests which could formerly not be got at with the ordinary insecticides. The latest reports on the results achieved in experiments made in tropical and subtropical countries are enthusiastic.

Fruit growers are already widely using the new product. Thanks to the non-poisonous nature of the insecticide, no regard need be paid in treating the trees to the state of ripeness of the fruit or to products grown under the trees. In wine-growing, the new insecticide has replaced arsenate as well as nicotine. Neither the ripening of the grapes nor fermentation nor the aroma or taste of the wine is affected by it. In vegetable raising, arsenates cannot be employed at all for reasons of hygiene, while the well-known contact insecticides (dusting with derris) are very limited in duration and effect. Here the new product with its continuous contact effect often provides the advantage of a single treatment.

In farming, there were quite a number of beetles doing great damage to the crops against which the only weapon used to be arsenic. Instead of having to shoot with cannons at sparrows as hitherto, the farmers can now lay the tiny chemical "contact mines," which silently kill the nervous system of the insects. Thousands of tons of potatoes, turnips, rapeseed, etc., have al-

ready been saved in a single season in Europe with the aid of Gesarol. In view of the widespread storing of grain in silos nowadays, it was an obvious step to try to attack corn pests with this new chemical group of contact insecticides. The result is a product being marketed now of which no more than 100 grams need be admixed to every 100 kilograms of grain in order to destroy these pests within a few days. Since the effective agent in these products is in some cases not even affected by soil bacteria, it was possible to put out an emulsion, called "Gesapon," which destroys insect pests living underground.

All in all it can be said that the discovery has opened up new paths in protecting plants from insect pests. Not only has the difficult problem of arsenates been largely done away with: new plant insecticides have been produced which offer undreamed-of possibilities in their employment. They represent new chemical weapons in mankind's struggle with nature.

FLY-PROOFING A STABLE

One particular use for Gesarol was already discovered in the course of the first experiments: in 1942 it was possible for the first time to put an end to the plague of flies in stables by spraying the ceilings and walls with a one-per-cent solution of Gesarol. Quite apart from their unhygienic aspects, flies in stables reduce, according to recent investigation, the cows' production of milk by as much as 14 per cent. A single treatment was enough to keep stables practically free of flies for five to six weeks.

As a result of these initial successes in the combating of flies, Neocid and its derivatives were produced for combating various insects which carry disease. Today the fight against lice has been greatly simplified through the proofing of underwear against lice. Underwear can now be impregnated very easily with a special preparation. As body lice are very sensitive to the toxic agent—they quickly cease to bite, stop laying eggs, and die within 24 to 48 hours—this impregnating of the underwear is the most efficient and enduring protection against lice known so far. Since lice are the carriers of typhus germs, the military authorities of all countries have shown great interest in the new insecticide, and the impregnating of soldiers' underwear with Neocid TX has been carried out successfully on various fronts during recent years. The method affords full protection against lice without in any way harming the wearer. While Professor Rose of the Robert Koch Institute in Berlin gave a lecture last spring to the Medical Society of Basel on successful typhus prophylaxis by the impregnating of underwear with Neocid, there have been more recent reports on the checking of a typhus epidemic in Naples with the new insecticide—known for short in the USA as DDT.

Of equal importance is the progress made in the prophylaxis of tropical diseases carried by mosquitoes as a result of the lasting effect of the new insecticide. Take malaria, for instance. It is spread by the anopheles mosquito which, by sucking the blood of a malaria sufferer, infects itself with the germ of this disease. In the stomach of the mosquito the malaria plasmodia undergo a development which finally brings them into the saliva glands of the mosquito. Not until this development of the plasmodia has been completed (according to the surrounding temperature it takes from one to four weeks) is the bite of the mosquito infectious. If in malaria-infested regions the ceilings and walls of living quarters are sprayed with a suitable solution of the new insecticide, there is a safe prospect of the mosquitoes coming into contact with the sprayed surface and quickly dying before the plasmodia have had time to develop to the infectious stage. None of the sprays such as Flit, etc., hitherto used for combating the mosquito plague possesses a lasting effect covering many weeks and, moreover, killing flies as well as mosquitoes in a like manner. In addition to this method, there is also another possibility of waging the hitherto hopeless fight against the malaria carriers far more successfully: when lightly dusted on the surfaces of water in which the anopheles breeds, the new insecticide is able in a concentration of one to three grams per square meter to destroy all mosquito larvae within a very short time. In contrast to the old method of covering ponds with kerosene or Paris green, the new method does not harm the fish and other living creatures in such waters.

Indeed, a new epoch in the combating of plant diseases, of epidemics and diseases of man and beast, has dawned.